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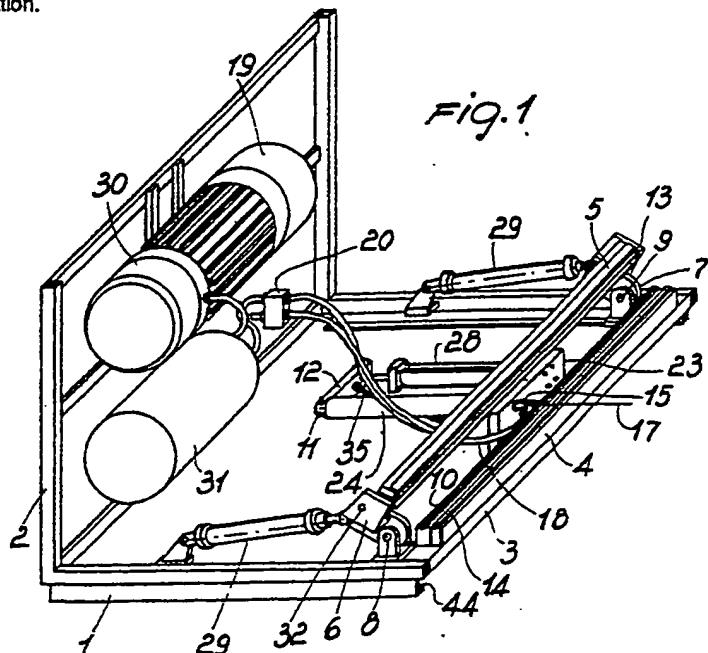
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(54) Apparatus for vacuum-packaging articles in flexible bags

(57) An apparatus for vacuum-packaging articles in flexible bags or envelopes, which comprises a supporting frame 1, two jaws 4, 5 one of which is pivoted on the other, actuating means 29 for the or each pivoting jaw, a sealing gasket 10 on an active face of one or both jaws 4, 5, a welding rod 14 located on one or both jaws and spaced from the gasket, a fixed suction nozzle 15 extending between the jaws beyond the sealing gasket when the jaws 4, 5 are closed together, a suction pump 19 whose intake is in fluid communication with the nozzle 15, at least one wire or rod 17 movably arranged in the nozzle and arranged to protrude out of it so as to extend between and beyond the jaws 4, 5 to enter a bag or envelope clamped by the jaws to the nozzle to be air-evacuated and to retract into the nozzle before the bag or envelope is sealed, and control means 16, 24, 28 (Fig 3) for operating the wire or rod, which functions to stop the bag blocking the suction nozzle during evacuation.

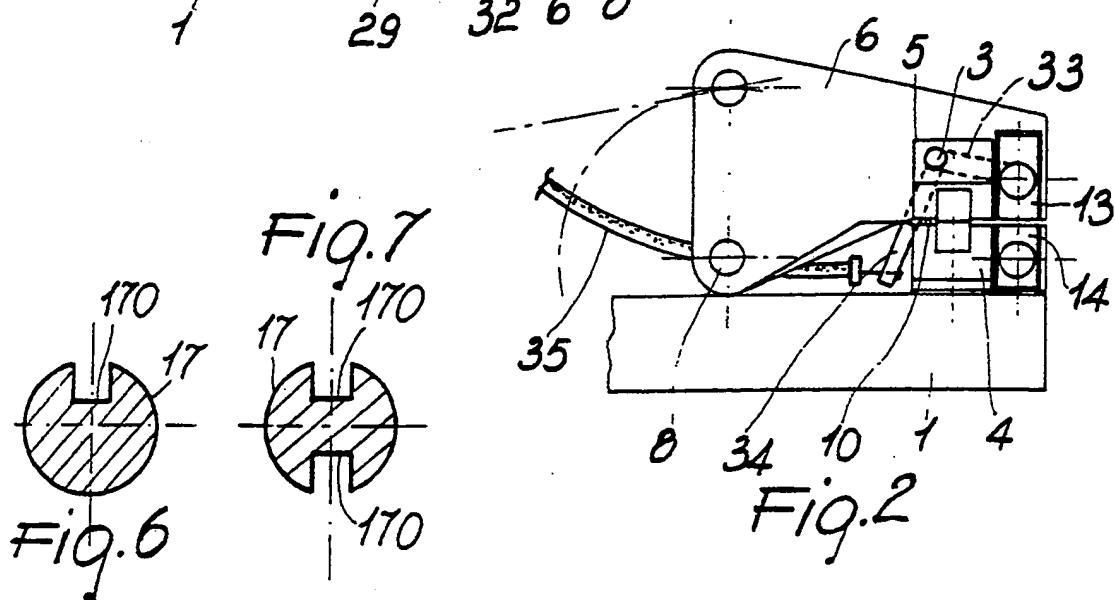
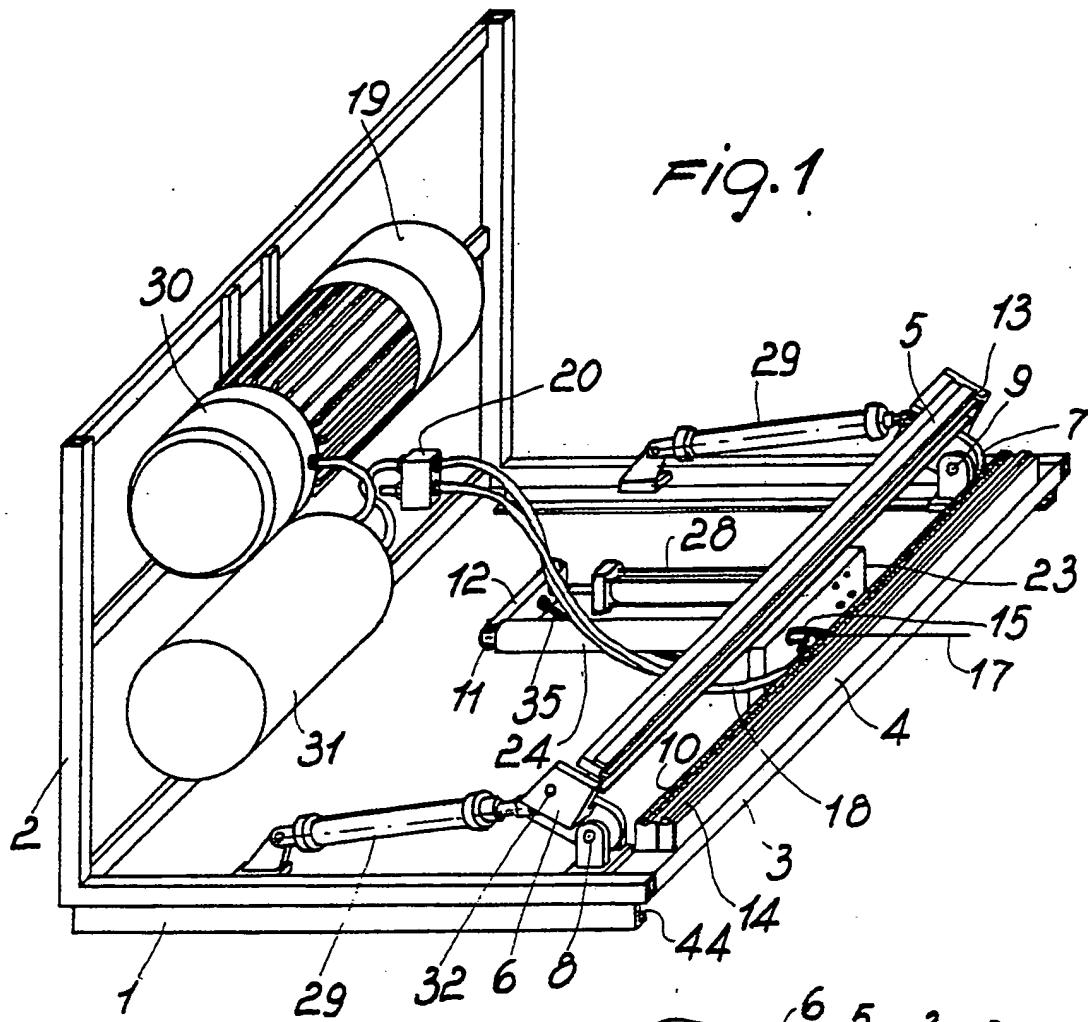


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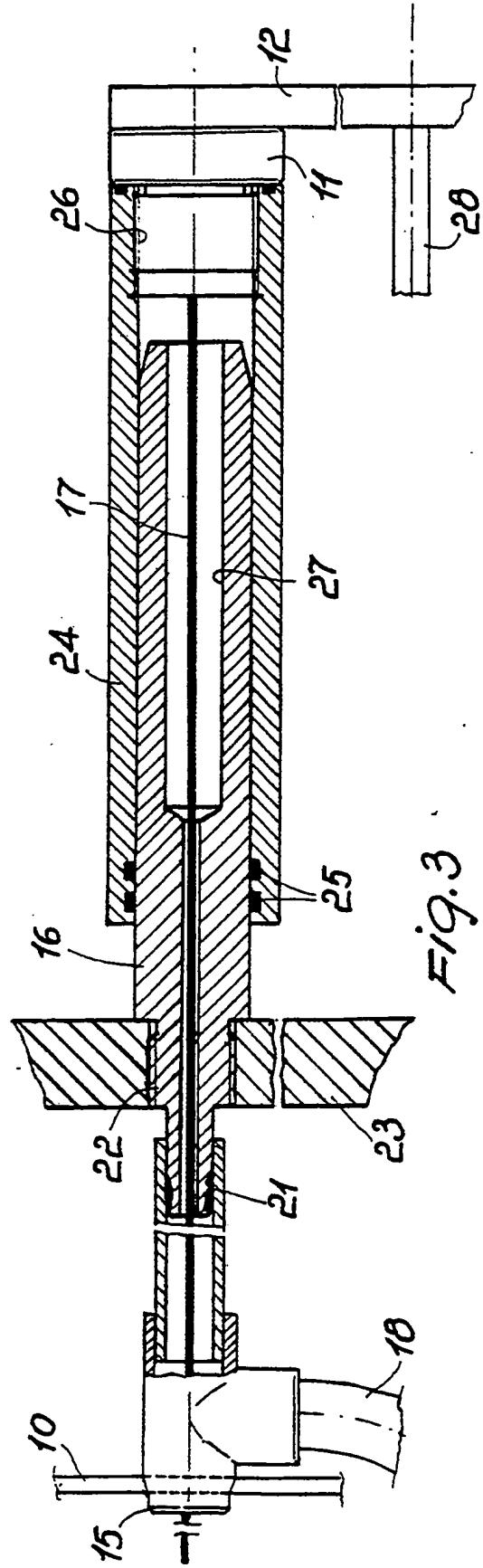


Fig. 3

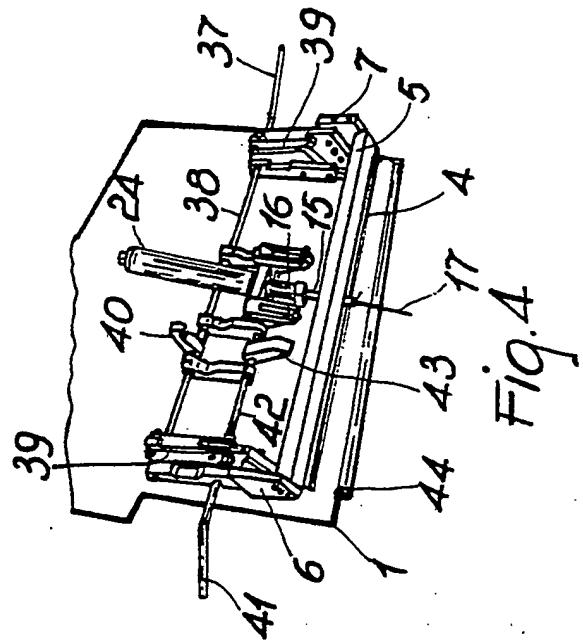
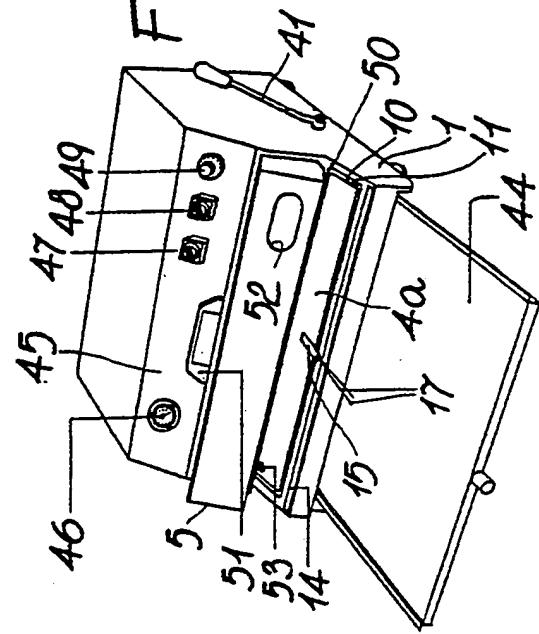


Fig. 4

Fig. 5



APPARATUS FOR VACUUM-PACKAGING ARTICLES IN FLEXIBLE BAGS

The present invention relates to an apparatus for vacuum-packaging products or articles in containers such as bags and envelopes made of flexible and weldable materials.

Packaging machines for evacuating air from, and heat-sealing the mouth of, bags or envelopes containing products to be packaged, e.g. food products or the like materials, have long been known. Bell and other packaging machines have already been proposed. Such known machines have two jaws between which the mouth of a container of a sealable and flexible material, such as a bag or envelope of plastic material containing the product to be packaged, is placed, and air extraction means, generally comprising one or more nozzles in communication with the intake of a suction pump and designed to move forwards so as to enter the mouth of the bag or envelope to extract most of the air contained in the container, and backwards away from the bag mouth before its sealing. Along the jaws there is usually provided a pair of welding rods, each comprising an electric resistor.

In such known machines, problems of excessive narrowing of the container mouth during air evacuation or problems of vacuum keeping between air evacuation and sealing operation are often encountered. This occurs because the container, both for the air evacuation and the sealing operation is arranged with its mouth squeezed between the jaws that are provided with suitable soft clamping gaskets, between which the suction nozzle extends. In fact, it may happen that as soon as suction begins, the mouth of the container collapses around and in front of the nozzle, thus clogging it, so that sufficient extraction of air from the container's interior

is either prevented or obtained in excessively long times, or even if the desired degree of vacuum is reached, air leaks towards the interior of the container can occur during the backward movement of the nozzle with equally undesirable consequences.

An object of the present invention is to provide an apparatus for vacuum packaging various products, which is very simple in structure, is practical in use and does not possess the above-described disadvantages.

This and other objects which will become better apparent hereinafter are achieved by an apparatus for vacuum-packaging products in flexible bags or envelopes, which comprises a supporting frame, two plate-like jaws at least one of which is pivoted on a longitudinal axis so as to open and close one with respect to the other, at least one sealing gasket on an active face of at least one of the jaws, at least one welding rod located on a respective jaw and arranged spaced from the gasket on it, at least one fixed suction nozzle arranged adjacent to the jaws so as to extend therebetween beyond the sealing gasket or gaskets when the jaws are closed, a suction pump whose intake is in fluid communication with the or each nozzle, at least one relatively thin elongated element movably arranged in the nozzle, thereby protruding out of it to extend between and beyond the jaws to enter a bag or envelope to be air-evacuated and to retract into the nozzle upon completion of air-evacuation operation, and control means for operating the elongated element.

Advantageously, the elongated element can comprise a steel wire strand, a rod or band of steel or other suitable

material.

The invention is described below in greater detail with reference to the accompanying drawings, wherein:

Figure 1 is a perspective diagrammatic view of an apparatus according to the invention;

Figure 2 is a side elevation view of a side plate or lever of the apparatus of Figure 1;

Figure 3 is a sectional view of a guide device;

Figure 4 is a perspective view of an apparatus according to the invention with manual control;

Figure 5 is a diagrammatic perspective view of another embodiment of the vacuum-packaging apparatus according to the invention; and

Figures 6 and 7 show cross-sectional views of two configurations of an elongated element.

In the various Figures of the accompanying drawings, the same or similar components have been indicated with identical reference numerals.

With reference to Figures 1 to 3, it will be seen that a vacuum-packaging apparatus according to the invention comprises a supporting framework comprising a front bearing frame 1 and a rear frame 2 which is or can be erected. A plate-like jaw 4 is fixed to a front crosspiece 3 of the bearing frame 1 and extends substantially throughout the entire length of the crosspiece 3. Another plate-like jaw 5 is carried by a pair of side plates or levers 6 and 7 which are pivoted or hinged, at 8 and 9 respectively, about a common longitudinal pivoting axis parallel to the jaws 4 and 5. Thus the jaw 5 can be opened (raised) and closed (lowered) relatively to the fixed jaw 4 by rotating its side

plates 6 and 7 about their pivoting axis.

On each active face of the jaws 4 and 5 there is provided a sealing gasket 10. At the front edge of each jaw a longitudinal welding (resistor) rod, 13 and 14 respectively, extends parallel to, and spaced from, the gasket 10 and is preferably externally protected by a layer of coating material, e.g. Teflon.

At the middle zone of the jaws 4 and 5, a nozzle 15 is fixed to the rear side of the plate 4 and extends from the back of the plate 4 to above and beyond the gasket 10. The nozzle 15 can have its free end flattened, whereas its other end, that one disposed away from the jaws, is sealingly connected to a guide sleeve 16 in which an elongated rod-like element 17, e.g. comprising a cable, a steel wire strand, a metal or plastic material rod and the like, is movably mounted (Figure 3).

The nozzle 15, or the sleeve 16, is connected by means of a duct 18 to the intake of a motor-driven pump 19, via an electric control valve 20.

More particularly, with reference to Figure 3, it can be seen that the sleeve 16 has a threaded tip 21 coupled to the nozzle 15 and an enlarged and threaded intermediate portion 22 for removably fixing the sleeve 16 to a bracket or supporting plate 23 secured, e.g. welded, to the crosspiece 3. The remaining portion of the sleeve 16 is externally smooth and arranged to slide telescopically in an outer receiving and guide cylinder 24. The latter has an end from which the sleeve 16 protrudes, having one or more annular seats accommodating sealing gaskets 25, whereas its other end has an inner threaded portion 26 for removably and

sealingly accommodating a closing plug 11 to which an end of the wire or rod 17 is secured. Thus, the wire or rod 17 extends throughout an inner axial cavity 27 of the sleeve 16 and through the nozzle 15. Telescopic movement of the elements 16 and 24 can be imparted by a pneumatic double-acting jack 28, whose piston rod is fixed, e.g. by means of a clamp or crosspiece 12, to the end of the cylinder 24 closed by the plug 11. Thus, the sleeve 16, the cylinder 24 and the jack 28 constitute a guide and control means for the elongated element 17.

The side plates 6 and 7 carrying the upper movable jaw 5 can be actuated by one or two pneumatic double-acting jacks 29. To this end each jack 29 and the jack 28 are operatively connected to the electric control valve 20 which is arranged to set the various jacks in fluid communication with either a compressor 30 mounted on the driving shaft of the pump 19 or with a compressed-air storage tank 31.

Advantageously, a bar 32 is rotatably mounted on the movable jaw 5 and carries one or more pusher sliding blocks 33 as well as a cross arm 34 rigid with it which can be actuated, thus causing the bar 32 to rotate and the sliding blocks 33 to act against the bar 5 owing to a draw wire 35 which is connected either to cylinder 24 or to the piston rod of the jack 28 or to the crosspiece 12 and has a length such that it is pulled only at the end of each extension stroke of the jack 28, as will become better apparent hereinafter.

The operation of a vacuum packaging apparatus as described above is quite simple. Initially, the jaws 4 and 5 are open and the operator places the mouth of a flexible

envelope or bag to be evacuated and sealed flat on the lower jaw 4, while making sure that the elongated element 17 protruding from the nozzle 15 has entered the envelope or bag. Upon pressing a suitable control pushbutton or pedal (not shown), an electric control signal is supplied to the valve 20, which operates the jacks 29, thus causing the jaw 5 to close onto the jaw 4 without forcing the said jaws one against the other but moving them near enough to ensure airtight sealing. Once the jaws 4 and 5 are closed on each other, the motor-driven pump 19 is set to work, e.g. by means of microswitches, not shown, operated by the jacks 29. The motor-driven pump 19 sucks air from the envelope or bag to be sealed via the duct 18 and the nozzle 15, being assisted in this by the rod-like element 17 which deeply extends into the envelope or bag to be sealed, may contact the products contained in it and ensure rapid evacuation of substantially all of the air contained therein. As a matter of fact, the rod-like element 17 prevents the wall of the bag or envelope from adhering to the nozzle 15, while keeping an active connection between the interior of the envelope or bag, the product or article in it and the nozzle 15. This is better achieved when the element 17 is formed with one or more longitudinal grooves or channels 170 as shown in Figures 6 and 7. Once the desired degree of vacuum, e.g. measured by a suitable vacuometer (46 in Figure 5), is reached, the jack 28 is operated which, in turn, causes the extension of the telescopic elements 16 and 24, thus causing the elongated element 17 to move back inside the sleeve 16. During the final step of air extraction retraction of the element 17, a wire or cable 35, is pulled, thus firmly

clamping the upper plate 5 against the lower plate 4 and, at the same time, a microswitch (not shown) arranged behind the piston rod of the jack 28 feeds electric current to the resistors 13 and 14 built in the plates 4 and 5 to heat seal the plastic bag or envelope. Instead of a cable 35, one or more solenoid controls can be provided to actuate the upper jaw 5 by supplying them with electric current when the elongated element 17 is caused to move back into the nozzle 15. In this manner, an uninterrupted and uniform heat-sealing is obtained along the entire extension of the envelope or bag mouth as the latter is no longer hindered by the elongated element 17. Once the heat-sealing operation is terminated, which operation can be controlled by a timer (not shown) also arranged to stop the motor-driven pump 19, the jacks 29 are actuated to open or raise the upper jaw 5. The packaged envelope, now air evacuated and sealed, can then be removed from the apparatus.

Figure 4 illustrates a manually operated version of a vacuum packaging apparatus according to the invention. In this case lifting and lowering of the upper jaw 5 is caused by a lever 37 which extends laterally on one side of the apparatus and is arranged to actuate a rotatable rod 38 on which a pair of articulation arms 39 for the jaw 5 is fixed. On the rod 38 an abutment arm 40 is also fixed which prevents the elongated element 17 from coming out of the nozzle 15 when the jaw 5 is closed on the jaw 4, as will be further explained hereinafter.

At the other side of the apparatus a second actuation lever 41 projects which controls a respective rotatable rod 42 parallel to the rod 38 and arranged to control the

telescopic movements of the two components 16 and 24. The rod 42 in turn carries an abutting arm 43 designed to abut against the arm 40 on the rod 38 to allow the rod-like element 17 to protrude only if the upper jaw 5 has been raised. The operation of the apparatus of Figure 4 is otherwise similar to that of the apparatus illustrated in Figures 1 to 3.

Advantageously, below the fixed jaw 4 it is possible to provide an extractable lower plane 44 intended to act, in use, as resting plane for the bags or envelopes to be packaged.

Figure 5 shows a manually operated vacuum packaging apparatus similar to that illustrated in Figure 4, which has on its front wall 45 a vacuometer 46, a main switch 47, a warning light 48, a potentiometer 49.

The lower jaw 4 is fixed and rigid with the frame 1 and bears a welding bar 14. The sealing gasket 10 is shaped as an endless strip located in a respective quadrangular seat 11 which delimits an inner area 4a surrounded by the gasket 10. The upper box-like jaw 5 is hinged at 50 to the lower jaw 4 and has a handle 51 for being manually pressed onto and lifted from the lower jaw 4. A suction opening 52 is in communication with the intake of the pump 19 for air evacuation from the area 4a, and thus from the bag or envelope to be sealed as explained above.

A suction nozzle 53 can be arranged on the lower jaw 4 for connection to duct (not shown) for evacuating air from jars and the like, e.g. for preserving foodstuff under vacuum, in which case a suitable on-off valve (not shown), e.g. of a manually operated type, must be placed upstream

the nozzle 53.

CLAIMS

1. An apparatus for vacuum-packaging products in flexible bags and envelopes which includes a supporting frame (1), two jaws (4, 5) at least one of which is pivotably mounted with respect to the other, so as to open away from and close onto each other, actuating means (29) for the or each pivoting jaw, at least one sealing gasket (10) on an active face of at least one of said jaws (4, 5), at least one welding rod (14) on at least one jaw which is arranged spaced from said gasket or gaskets (10), at least one fixed suction nozzle (15) arranged adjacent to said jaws (4, 5) so as to extend therebetween beyond said sealing gasket or gaskets (10) when said jaws are in a closed position, a suction pump (19) connected to said fixed nozzle or nozzles (15), characterized in that it comprises at least one relatively thin elongated element (17) arranged to protrude from said nozzle (15) so as to extend between and beyond said jaws (4, 5), to enter a bag or envelope to assist in evacuating air from it and to retract into the nozzle (15) away from the bag or envelope upon completion of air evacuation, and control means (16, 24, 28) for the rod-like element.

2. An apparatus according to claim 1, characterized in that the or each elongated element (17) is formed with at least one longitudinal groove or channel (170).

3. An apparatus according to claim 1 or 2, characterized in that said control means comprises a sleeve (16) sealingly connected to, and arranged on, a straight portion of said fixed nozzle (15), a cylinder (24) telescopically accommodating the said sleeve (16), securing means (26) for

fixing the or each elongated element (17) to the said cylinder (24), so that the said elongated element (17) extends through the cylinder (24), the sleeve (16) and the nozzle (15), and actuation means (28) for the cylinder (24).

4. An apparatus according to claim 3, characterized in that said actuation means (28) comprises a double-acting pneumatic jack.

5. An apparatus according to claim 3 or 4, characterized in that clamping means are provided for actuating at least one jaw to be clamped against the other before energization of the or each welding rod (14).

6. An apparatus according to claim 5, characterized in that said clamping means comprise at least one sliding block (33) mounted fixed on a rotatable bar (32), an arm (34) fixed to said bar and projecting therefrom and driving means for said arm.

7. An apparatus according to claim 6, characterized in that it comprises link means (35) between the said arm (34) and said driving means, the said driving means comprising said double-acting jack (28).

8. An apparatus according to claim 6, characterized in that the said driving means comprises at least one solenoid.

9. An apparatus according to any one of the preceding claims, characterized in that the said actuating means comprises at least one jack.

10. An apparatus substantially as herein described with reference to the accompanying drawings.